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(54) **SYSTEM AND METHOD FOR IN-CONTEXT EXPLORATION OF SEARCH RESULTS**

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USPC 707/706, 728, 722, 732
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,006,225 A	12/1999	Bowman et al.
6,564,213 B1	5/2003	Ortega et al.
7,849,080 B2	12/2010	Chang et al.
7,921,107 B2	4/2011	Chang et al.
2007/0050339 A1	3/2007	Kasperski et al.
2007/0061331 A1	3/2007	Ramer
2007/0266002 A1	11/2007	Chowdhury
2008/0109401 A1	5/2008	Sareen et al.
2008/0208825 A1	8/2008	Curtis et al.
2009/0063461 A1	3/2009	Wang et al.
2009/0240683 A1	9/2009	Lazier et al.
2009/0248510 A1	10/2009	Ahluwalia

(Continued)

OTHER PUBLICATIONS

U.S. Appl. No. 12/332,618, filed Dec. 11, 2008, Office Final Action, Sep. 26, 2011.

(Continued)

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(57)   **ABSTRACT**

A method of providing in-context exploration of a query results web page, wherein the web page has at least one element and a plurality of query results, receives an indication of interest in the at least one element, and in response to the indication, emphasizes at least one query result relative to the plurality of query results.

21 Claims, 3 Drawing Sheets
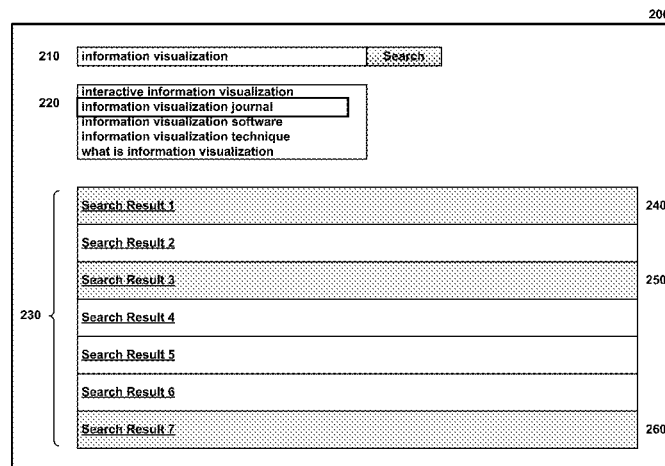
(56) **References Cited**

U.S. PATENT DOCUMENTS

2009/0327224 A1   12/2009 White et al.
2009/0327236 A1   12/2009 Denney et al.

OTHER PUBLICATIONS

U.S. Appl. No. 12/332,618, filed Dec. 11, 2008, Office Action, May 19, 2011.
U.S. Appl. No. 12/332,618, filed Dec. 11, 2008, Notice of Appeal Brief, Nov. 30, 2012.
U.S. Appl. No. 12/332,618, filed Dec. 11, 2008, Final Office Action, Jun. 4, 2012.
U.S. Appl. No. 12/332,618, filed Dec. 11, 2008, Examiners Answers, Jan. 29, 2013.
U.S. Appl. No. 12/332,618, filed Dec. 11, 2008, Advisory Action, Jul. 31, 2012.
U.S. Appl. No. 12/332,618, filed Dec. 11, 2008, Office Action, Oct. 28, 2015.
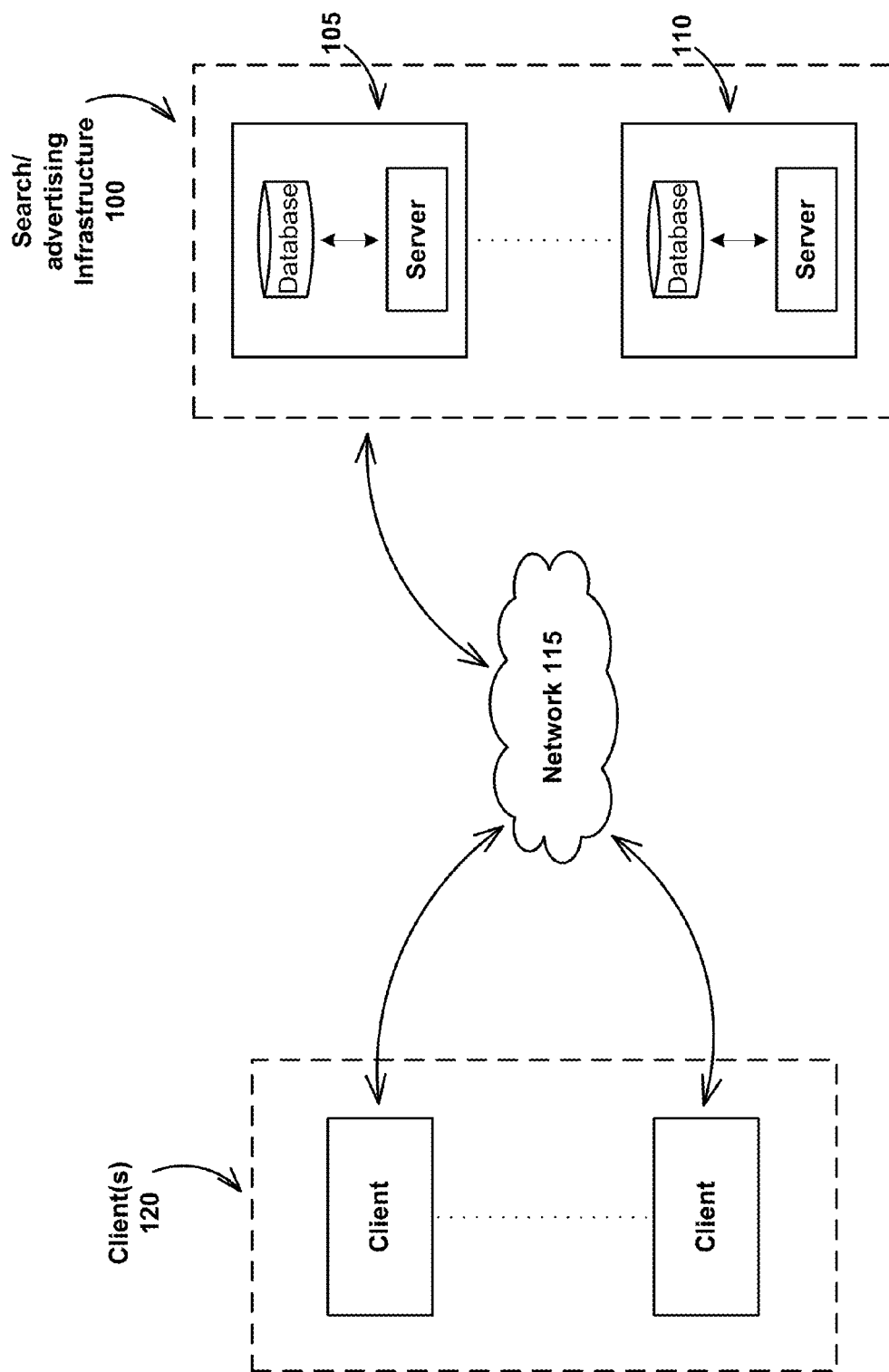U.S. Appl. No. 12/332,618, filed Dec. 11, 2008, Notice of Allowance, Dec. 18, 2015.
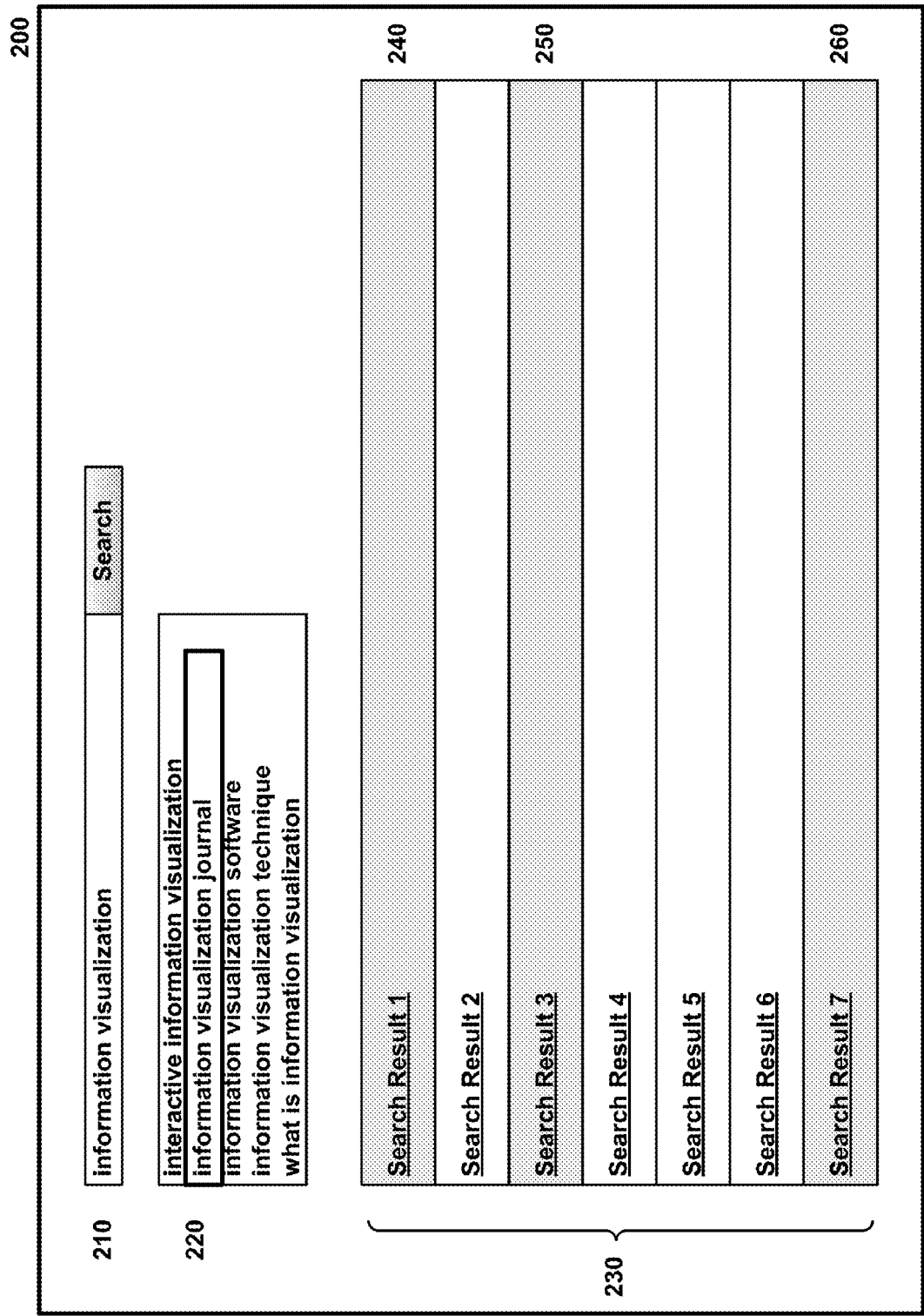
FIG. 1

200

210   information visualization   Search

220

interactive information visualization
information visualization journal
information visualization software
information visualization technique
what is information visualization

230

Search Result 1   240

Search Result 2

Search Result 3   250

Search Result 4

Search Result 5

Search Result 6

Search Result 7   260

FIG. 2

300

SEARCH PAGE

↓

SEARCH
REQUEST 305

310

RETRIEVAL
SYSTEM 350

320

SEARCH
ASSISTANT 355

SEARCH
RESULTS 315

SEARCH
SUGGESTIONS
325

330

CORRELATOR
360

CORRELATIONS
335

340

IN-CONTEXT
EXPLORER 365
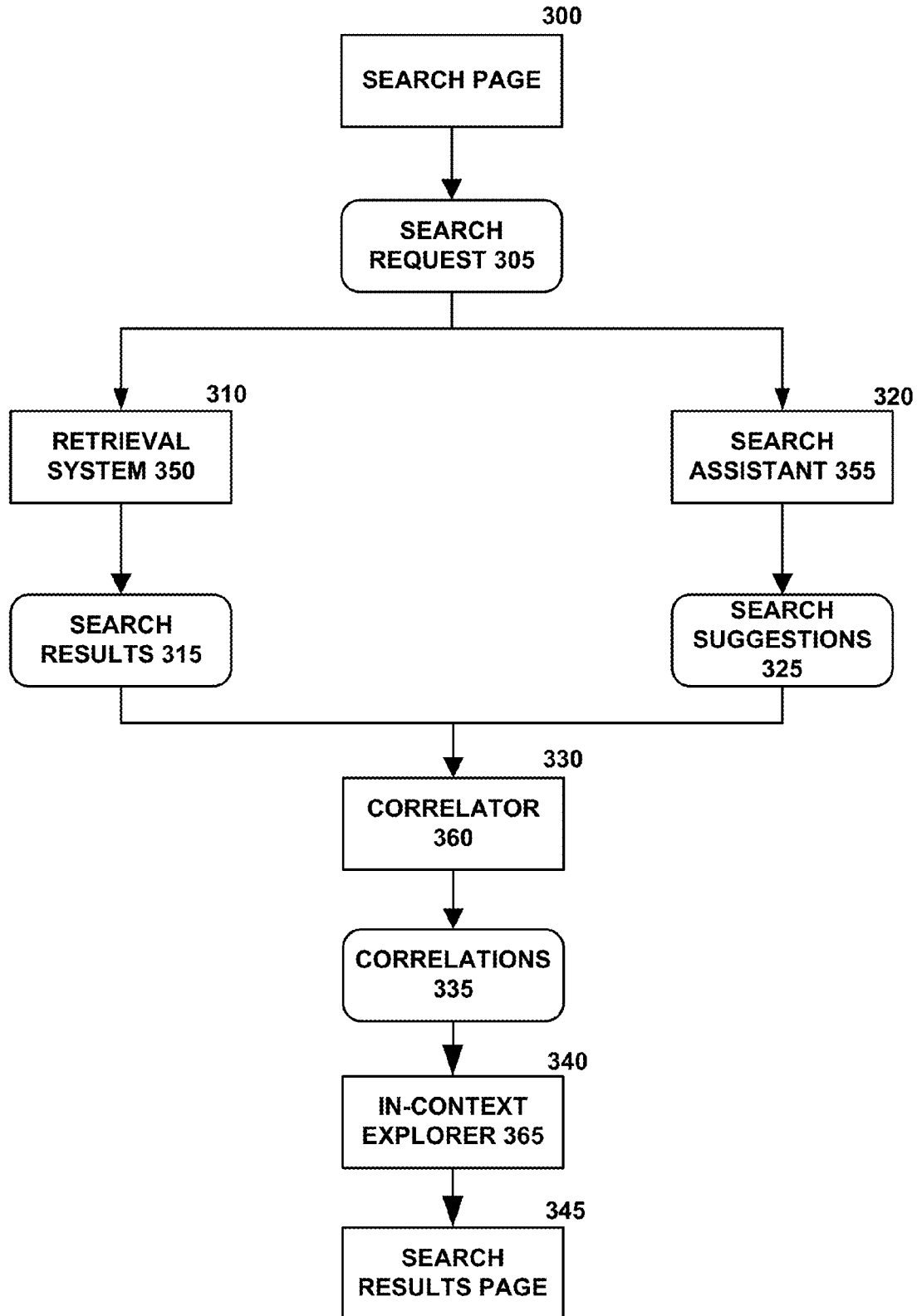
345

SEARCH
RESULTS PAGE

FIG. 3

SYSTEM AND METHOD FOR IN-CONTEXT EXPLORATION OF SEARCH RESULTS

RELATED APPLICATION DATA AND CLAIM OF PRIORITY

This application is a Continuation of prior U.S. patent application Ser. No. 12/332,618 entitled "System And Method For In-Context Exploration Of Search Results", filed Dec. 11, 2008, the contents of which are incorporated by reference for all purposes as if fully set forth herein.

BACKGROUND

1. Field of the Invention

Aspects of the present invention relate generally to providing an ability to refine a search without having to fully execute a separate or new search.

2. Description of Related Art

Currently, some search systems return suggestions together with the search results, and a user is given the option of choosing any of the search results or running one of the suggested searches. When the user chooses one of the suggested searches, a new search is performed and the results presented to the user, just as if the user manually entered the suggested search terms into the search engine. While this functionality can be helpful, it generally is not very efficient, as the user has to wait for the new search to complete before determining whether the refinement helped or hurt.

Thus, it is desirable to more densely interlink search suggestions with already-received search results.

SUMMARY

In light of the foregoing, it is a general object of the present invention to provide a system and method for providing instant feedback related to suggested searches and other web page elements.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. **1** is a functional block diagram of the general architecture of an exemplary embodiment of the present invention.

FIG. **2** is a search results web page illustrating operation of an exemplary embodiment of the present invention.

FIG. **3** illustrates generally a high-level architecture and process flow according to an embodiment of the present invention.

DETAILED DESCRIPTION

Detailed descriptions of one or more embodiments of the invention follow, examples of which may be graphically illustrated in the drawings. Each example and embodiment is provided by way of explanation of the invention, and is not meant as a limitation of the invention. For example, features described as part of one embodiment may be utilized with another embodiment to yield a further embodiment. It is intended that the present invention include these and other modifications and variations.

Aspects of the present invention are described below in the context of providing in-context feedback related to suggested searches received in response to a search query.

Throughout this disclosure, reference is made to "system," which is used to denote a search/advertising infrastructure through which an Internet search and/or advertising network operates (e.g., Yahoo!'s® Publisher Network, Yahoo!Search®, etc.). There currently are numerous search/advertising infrastructures (e.g., those run by Yahoo!®, Google™, etc.) and most offer similar services, such as, for example, responding to search queries from users, serving or presenting advertisements (which may be relevant to the search query), etc.; "serving" or "presenting," as used herein, is the mechanism by which advertisements are delivered to web pages.

FIG. **1** is a functional block diagram of the general architecture of an exemplary embodiment of the present invention. Search/advertising infrastructure **100**, as described above, may include any of a number of servers **105** and **110** (which optionally may include databases), etc. required for its operation; search/advertising infrastructure **100** also may implement the methods used to provide in-context exploration of search results to an end user, as detailed herein. Client(s) **120** may comprise a user at a computer carrying out typical web actions (e.g., browsing, searching, etc.). Search/advertising infrastructure **100** and Client(s) **120** are linked together through Network **115** (e.g., the Internet, etc.).

Throughout this description, reference is made to "query," which is used to denote a search query given by a user when performing a search through a search engine. A query can comprise terms, and may contain a single term, multiple terms, a phrase of terms, etc. Generally, a query is related to a request for information.

Conventional search results may include both the search results that correspond directly with the search query, and suggested or recommended searches provided by a search assistant. For example, if a user searches for "cars," he may receive from a search engine search results that correspond directly with that search query, and from a search assistant various recommended searches, such as, for example, "cars to buy," "car history," etc. Generally, the recommended searches are hyperlinked to the Universal Resource Indicator (URI) of a corresponding search so that the user can explore the recommended search by clicking on the link (i.e., the click causes the search engine to run, and provide results for, the recommended search). It will be appreciated that how the search assistant determines its suggestions is not critical to the invention, and that this may done using any currently known methods, or methods that may be developed in the future.

Thus, current search assistants aim to help the user by refining their information request through suggestions, and providing related terms for the search query. If the user decides to try one of the suggested search queries, a new search corresponding to the suggested query is performed. This mechanism can be very powerful, especially when the user has a specific information need, but is maybe not quite an expert on the topic. At the same time however, the user's lack of expertise or knowledge on the topic limits his ability to know in advance the likely result of the suggested refinement (i.e., the result of running a suggested search, etc.), which may lead to a time-inefficient, trial-and-error undertaking. The main problem is that, at the level of the user interface, the search assistant and the set of search results are completely de-coupled.

By interlinking the search results with the search assistant, instant feedback related to the recommendations provided by the search assistant can be realized, and the user can more efficiently explore the recommendations and more

quickly find the information he seeks. Generally, the instant feedback will relay to the user which of the current results corresponds to the context provided by the search assistant's suggestions; for the remainder of the detailed description, such results will be referred to as "in-context" results. Generally, the instant feedback may comprise any of a number of various ways of emphasizing the in-context results relative to the original results. For example, in-context results may be highlighted (e.g., by giving a yellow background to the associated text, etc.), non-in-context results may be faded, the size of the in-context results may be increased, etc.

As an example of in-context results, consider search results page **200** illustrated in FIG. **2**. Search box **210** contains a search query—"information visualization"—that a user has submitted to a search engine. Suggestions **220** are suggestions or recommendations provided by a search assistant, and presumably are related in some respect to the original search query.

Search results **230** may be the first few search results returned by the search engine. If the user mouses over the second suggestion—"information visualization journal"—in-context results **240**, **250**, and **260** may be highlighted or otherwise indicated in some manner as being related to the suggestion (i.e., those results, or types of results, may be returned by the search engine if the user clicks on the suggestion).

The correlations made between search results **230** and in-context results **240**, **250**, and **260** may be interacted with at the user-interface level by an in-context explorer, which can be implemented in any of a number of ways. For example, consider a JavaScript™ implementation whereby the JavaScript is generated server-side and incorporated into the search results web page shown to the user. The JavaScript™ may control the feedback given to the user when he mouses over (or performs some similar action on) a suggestion provided by the search assistant.

FIG. **3** illustrates generally a high-level architecture and process flow according to an embodiment of the present invention. At block **300** a user may arrive at a search page provided by, for example, search/advertising infrastructure **100**, where the user may execute search request **305**. Search request **305** is sent to both retrieval system **350** and search assistant **355**, as shown at blocks **310** and **320**, respectively. Though FIG. **3** shows blocks **310** and **320** occurring simultaneously, it will be appreciated that retrieval system **350** may, for example, receive the search request before search assistant **355**, and that such order is not critical to the invention.

Retrieval system **350** may be a search/advertising infrastructure as described with regard to FIG. **1**. Generally, retrieval system **310** will receive and respond to search request **305** with search results **315**. Generally, search assistant **355** will receive and respond to search request **305** with search suggestions **325**. At block **330**, search results **305** and search suggestions **325** are received by correlator **360**, which attempts to make correlations **335** between them (i.e., "in-context" results, as detailed herein). It will be appreciated that correlator **360** may be a part of, or entirely separate from, a search/advertising infrastructure, may be implemented in hardware or software, etc. In-context explorer **365** incorporates correlations **335** determined by correlator **360** into the search results page, such that correlations **335** may be explored by the recipient of the search results page, as shown at blocks **340** and **345**. As discussed, in-context explorer **365** may be implemented in a variety of ways, including as JavaScript™ within the search results page.

It will be appreciated that the invention is not limited to search suggestions, but in fact may comprise any other "linkable" element presented on a search results page, including geographic maps, keywords, photographs, advertisements, etc. For example, consider a search executed on a photo-sharing service that hosts photos from users all over the world. The results of the search may be presented together with a map of the world, and points on the map may be correlated with the search results (by, for example, geographic information added to a photo by the camera that took it or by the user, etc.). In this scenario, an in-context explorer may emphasize photos returned by the search that correspond to a location on the map as indicated by the user (e.g., the user may hover his mouse over Florida, and if any of the photo search results corresponds to Florida, those results may be emphasized).

It also will be appreciated that the correlations made between the linkable elements (including search suggestions) and the in-context results may be accomplished in various ways, and that the methods used are not necessarily critical to the invention. For example, in the context of web search, a correlator may correlate search suggestions with search results by looking for similarities between the terms comprising a search suggestion and the content associated with each of the search results, including metadata incorporated into the source of the web page, or otherwise known by the search engine (e.g., the title of the web page linked to by a search result, the content of the web page linked to by a search result, etc.).

As another example, consider a social-bookmarking service where users of the service can add "keywords" (or "tags") or other descriptors to a bookmark; such keywords may be used by a correlator to correlate suggested keywords with search results, thus creating in-context results. For example, if a user searches for "exotic cars" on a social-bookmarking service, the service may return results that correspond to the search, and a search assistant (or similar) may determine and suggest keywords that may be relevant to the search (e.g., "car," "automobile," "horsepower," etc.), where the keywords already may be associated with one or more of the search results (e.g., a user who added one of the search results to the service also may have assigned to that result various keywords, etc.). When the user invokes the in-context explorer by, for example, mousing over a suggested keyword, the corresponding in-context result(s) may be emphasized.

As still another example, consider a photo-sharing service where a correlator may make correlations between photos based on keywords (e.g., those given by users of the system who upload/view the photos), geo-location information associated with a photo (e.g., as provided manually by a user, automatically by a camera, etc.), etc. Such correlations also may be made based on the content of the image; in this regard, it will be appreciated that a photo-sharing service may provide the ability to match images according to general shapes, colors, etc. For example, if a user searches for "big ben" through a photo-sharing service that provides content-based matching, he may be given a list of search results (in the form of, say, thumbnails) and samples with which to further filter the search results. After choosing one or more samples, in-context results may be determined (and emphasized) based on content-matching done between the chosen sample images and the search results.

In-context results need not be limited to just some subset of the original results, but also may comprise advertisements shown alongside the search results. In the case of a search/advertising infrastructure as detailed above—where the

infrastructure may provide both the search results and adver-tisements that presumably are related to the search—the correlator may be able to determine which of the ads are relevant to the suggestions, and this determination may be based on any of various known methods. For example, when an advertiser initially purchases an ad to be shown alongside search results, he may provide with that purchase "key-words," or some other descriptor of the ad, and the keywords may be used to correlate the ad with a search suggestion (just as the keywords may now be used to inform the determi-nation of whether the ad should be shown in response to a particular query). As another example, a correlation may be based on an analysis of the content of the page to which the ad points, etc.

The sequence and numbering of blocks depicted in FIG. 3 is not intended to imply an order of operations to the exclusion of other possibilities. Those of skill in the art will appreciate that the foregoing systems and methods are susceptible of various modifications and alterations. For example, while FIG. 3 concerns the specific example of correlating search results with search suggestions, other correlations may be made, including those discussed herein (e.g., correlating advertisements on the page with a search suggestion, etc.).

Those of skill in the art also will appreciate that the methods described herein may be performed on a computer which executes instructions stored on a computer-readable medium. The medium may comprise a variety of volatile and non-volatile storage devices, systems, or elements, including but not limited to solid-state memory, fixed media devices, and removable media which may be used in com-puters having removable media devices.

Several features and aspects of the present invention have been illustrated and described in detail with reference to particular embodiments by way of example only, and not by way of limitation. Those of skill in the art will appreciate that alternative implementations and various modifications to the disclosed embodiments are within the scope and contemplation of the present disclosure. Therefore, it is intended that the invention be considered as limited only by the scope of the appended claims.

What is claimed is:

1. One or more non-transitory computer-readable media storing instructions which, when processed by one or more processors, cause:

generating a search results webpage for a search query, wherein the search results webpage includes both a plurality of search results for the search query and a plurality of suggested search queries related to the search query;

detecting an indication of interest in a particular suggested search query from the plurality of suggested search queries;

in response to detecting the indication of interest in the particular suggested search query from the plurality of suggested search queries:

determine, from the plurality of search results for the search query, a subset of search results that satisfy both the particular suggested search query and the search query, and

determine one or more advertisements that are corre-lated to the particular suggested search query; and

concurrently with display of the plurality of search results for the search query, displaying the one or more adver-tisements that are correlated to the particular suggested search query and visually emphasizing the subset of search results that satisfy both the particular suggested

search query and the search query, wherein visually emphasizing the subset of search results that satisfy both the particular suggested search query and the search query is implemented by one or more of high-lighting the subset of search results that satisfy both the particular suggested search query and the search query or de-emphasizing search results from the plurality of search results for the search query other than the subset of search results that satisfy both the particular sug-gested search query and the search query.

2. The one or more non-transitory computer-readable media of claim 1, wherein determining one or more adver-tisements that are correlated to the particular suggested search query includes determining one or more advertise-ments that have corresponding keywords that are correlated to the particular suggested search query.

3. The one or more non-transitory computer-readable media of claim 2, wherein the corresponding keywords that are correlated to the particular suggested search query are contained in the particular suggested search query.

4. The one or more non-transitory computer-readable media of claim 1, wherein determining one or more adver-tisements that are correlated to the particular suggested search query includes performing an analysis of particular content of the search results webpage, wherein the particular content of the search results webpage is related to the one or more advertisements.

5. The one or more non-transitory computer-readable media of claim 1, wherein visually emphasizing the subset of search results that satisfy both the particular suggested search query and the search query includes visually empha-sizing an advertisement on the search results webpage.

6. The one or more non-transitory computer-readable media of claim 1, wherein the plurality of suggested search queries includes one or more of one or more query sugges-tions, one or more keywords, one or more photographs, one or more advertisements, and one or more geographic maps.

7. The one or more non-transitory computer-readable media of claim 1, wherein the subset of search results from the plurality of search results for the search query that satisfy both the particular suggested search query and the search query satisfy the particular suggested search query based upon one or more keywords or content associated with both the particular suggested search query and the subset of search results from the plurality of search results for the search query.

8. An apparatus comprising:

one or more processors; and

one or more memories storing instructions which, when processed by one or more processors, cause:

generating a search results webpage for a search query, wherein the search results webpage includes both a plurality of search results for the search query and a plurality of suggested search queries related to the search query;

detecting an indication of interest in a particular sug-gested search query from the plurality of suggested search queries;

in response to detecting the indication of interest in the particular suggested search query from the plurality of suggested search queries:

determine, from the plurality of search results for the search query, a subset of search results that satisfy both the particular suggested search query and the search query, and

determine one or more advertisements that are corre-lated to the particular suggested search query; and

concurrently with display of the plurality of search results for the search query, displaying the one or more advertisements that are correlated to the particular suggested search query and visually emphasizing the subset of search results that satisfy both the particular suggested search query and the search query, wherein visually emphasizing the subset of search results that satisfy both the particular suggested search query and the search query is implemented by one or more of highlighting the subset of search results that satisfy both the particular suggested search query and the search query or de-emphasizing search results from the plurality of search results for the search query other than the subset of search results that satisfy both the particular suggested search query and the search query.

9. The apparatus of claim 8, wherein determining one or more advertisements that are correlated to the particular suggested search query includes determining one or more advertisements that have corresponding keywords that are correlated to the particular suggested search query.

10. The apparatus of claim 9, wherein the corresponding keywords that are correlated to the particular suggested search query are contained in the particular suggested search query.

11. The apparatus of claim 8, wherein determining one or more advertisements that are correlated to the particular suggested search query includes performing an analysis of particular content of the search results webpage, wherein the particular content of the search results webpage is related to the one or more advertisements.

12. The apparatus of claim 8, wherein visually emphasizing the subset of search results that satisfy both the particular suggested search query and the search query includes visually emphasizing an advertisement on the search results webpage.

13. The apparatus of claim 8, wherein the plurality of suggested search queries includes one or more of one or more query suggestions, one or more keywords, one or more photographs, one or more advertisements, and one or more geographic maps.

14. The apparatus of claim 8, wherein the subset of search results from the plurality of search results for the search query that satisfy both the particular suggested search query and the search query satisfy the particular suggested search query based upon one or more keywords or content associated with both the particular suggested search query and the subset of search results from the plurality of search results for the search query.

15. A computer-implemented method comprising:

generating a search results webpage for a search query, wherein the search results webpage includes both a plurality of search results for the search query and a plurality of suggested search queries related to the search query;

detecting an indication of interest in a particular suggested search query from the plurality of suggested search queries;

in response to detecting the indication of interest in the particular suggested search query from the plurality of suggested search queries:

determine, from the plurality of search results for the search query, a subset of search results that satisfy both the particular suggested search query and the search query, and

determine one or more advertisements that are correlated to the particular suggested search query; and

concurrently with display of the plurality of search results for the search query, displaying the one or more advertisements that are correlated to the particular suggested search query and visually emphasizing the subset of search results that satisfy both the particular suggested search query and the search query, wherein visually emphasizing the subset of search results that satisfy both the particular suggested search query and the search query is implemented by one or more of highlighting the subset of search results that satisfy both the particular suggested search query and the search query or de-emphasizing search results from the plurality of search results for the search query other than the subset of search results that satisfy both the particular suggested search query and the search query.

16. The computer-implemented method of claim 15, wherein determining one or more advertisements that are correlated to the particular suggested search query includes determining one or more advertisements that have corresponding keywords that are correlated to the particular suggested search query.

17. The computer-implemented method of claim 16, wherein the corresponding keywords that are correlated to the particular suggested search query are contained in the particular suggested search query.

18. The computer-implemented method of claim 15, wherein determining one or more advertisements that are correlated to the particular suggested search query includes performing an analysis of particular content of the search results webpage, wherein the particular content of the search results webpage is related to the one or more advertisements.

19. The computer-implemented method of claim 15, wherein visually emphasizing the subset of search results that satisfy both the particular suggested search query and the search query includes visually emphasizing an advertisement on the search results webpage.

20. The computer-implemented method of claim 15, wherein the plurality of suggested search queries includes one or more of one or more query suggestions, one or more keywords, one or more photographs, one or more advertisements, and one or more geographic maps.

21. The computer-implemented method of claim 15, wherein the subset of search results from the plurality of search results for the search query that satisfy both the particular suggested search query and the search query satisfy the particular suggested search query based upon one or more keywords or content associated with both the particular suggested search query and the subset of search results from the plurality of search results for the search query.

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